

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE APRIL 1997		3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE 44 Tank Report Impact on Combat Service Support (CSS)				5. FUNDING NUMBERS	
6. AUTHOR(S) Jeannette Blumenthal, Operations Research Analyst					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Director, TRADOC Analysis Center - Fort Lee ATTN: ATRC-LP 401 First Street, Suite 401 Fort Lee, VA 23801-6140				8. PERFORMING ORGANIZATION REPORT NUMBER TRAC-TR-0597	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Commander, Combined Arms Support Command (CASCOM) 3901 A Avenue, Suite 200 Fort Lee, VA 23801-1809				10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES					
DTIC QUALITY INSPECTED 2					
12a. DISTRIBUTION/AVAILABILITY STATEMENT Distribution Statement A: Approved for Public Release; Distribution is Unlimited				12b. DISTRIBUTION CODE A	
13. ABSTRACT (Maximum 200 words) In the Force XXI Heavy Division, the impact upon CSS due to the decrease in the number of tanks in each Armor Battalion is a minor reduction in the requirements for CSS personnel-maintainers and vehicle operators—with a small reduction in the number of support vehicles. For the Division, the largest personnel change is in direct positions—crew. For the Force XXI Heavy Division, Approved Interim Design-Objective, 73 percent of the reduction in personnel requirements is attributable to operational combat positions. The impact upon CSS is small compared to the reductions in the rest of the force structure. At the forward support level, about forty percent of the CSS positions are some type of maintenance. If all or part of the Direct Support (DS) maintenance is not counted in the CSS total, the shift is greater—up to 79 percent of the reduction would be due to combat operations positions. In addition, the CSS positions are more difficult to identify and quantify. Much of the CSS support is not totally dedicated to the tanks. Even the majority of the maintainers work on more than just tanks. Any reduction in CSS structure has a potentially broad impact and increases the risk of not having enough support for the systems which remain.					
14. SUBJECT TERMS Combat Service Support (CSS); Force XXI; Support Requirements; Armor Battalion				15. NUMBER OF PAGES 25	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL		

19970415 028

GENERAL INSTRUCTIONS FOR COMPLETING SF 298

The Report Documentation Page (RDP) is used in announcing and cataloging reports. It is important that this information be consistent with the rest of the report, particularly the cover and title page. Instructions for filling in each block of the form follow. It is important to **stay within the lines** to meet **optical scanning requirements**.

Block 1. Agency Use Only (Leave blank).

Block 2. Report Date. Full publication date including day, month, and year, if available (e.g. 1 Jan 88). Must cite at least the year.

Block 3. Type of Report and Dates Covered. State whether report is interim, final, etc. If applicable, enter inclusive report dates (e.g. 10 Jun 87 - 30 Jun 88).

Block 4. Title and Subtitle. A title is taken from the part of the report that provides the most meaningful and complete information. When a report is prepared in more than one volume, repeat the primary title, add volume number, and include subtitle for the specific volume. On classified documents enter the title classification in parentheses.

Block 5. Funding Numbers. To include contract and grant numbers; may include program element number(s), project number(s), task number(s), and work unit number(s). Use the following labels:

C - Contract	PR - Project
G - Grant	TA - Task
PE - Program Element	WU - Work Unit Accession No.

Block 6. Author(s). Name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. If editor or compiler, this should follow the name(s).

Block 7. Performing Organization Name(s) and Address(es). Self-explanatory.

Block 8. Performing Organization Report Number. Enter the unique alphanumeric report number(s) assigned by the organization performing the report.

Block 9. Sponsoring/Monitoring Agency Name(s) and Address(es). Self-explanatory.

Block 10. Sponsoring/Monitoring Agency Report Number. (If known)

Block 11. Supplementary Notes. Enter information not included elsewhere such as: Prepared in cooperation with...; Trans. of...; To be published in.... When a report is revised, include a statement whether the new report supersedes or supplements the older report.

Block 12a. Distribution/Availability Statement. Denotes public availability or limitations. Cite any availability to the public. Enter additional limitations or special markings in all capitals (e.g. NOFORN, REL, ITAR).

DOD - See DoDD 5230.24, "Distribution Statements on Technical Documents."

DOE - See authorities.

NASA - See Handbook NHB 2200.2.

NTIS - Leave blank.

Block 12b. Distribution Code.

DOD - Leave blank.

DOE - Enter DOE distribution categories from the Standard Distribution for Unclassified Scientific and Technical Reports.

NASA - Leave blank.

NTIS - Leave blank.

Block 13. Abstract. Include a brief (*Maximum 200 words*) factual summary of the most significant information contained in the report.

Block 14. Subject Terms. Keywords or phrases identifying major subjects in the report.

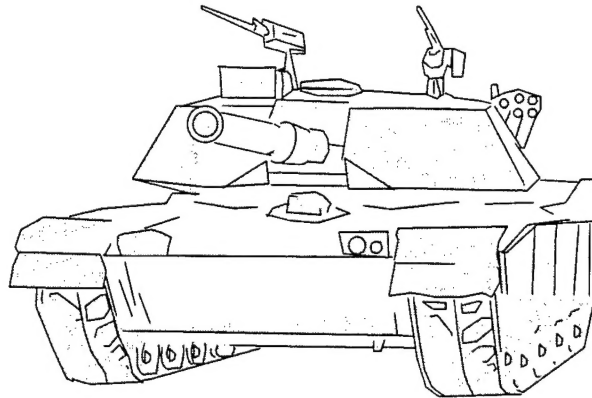
Block 15. Number of Pages. Enter the total number of pages.

Block 16. Price Code. Enter appropriate price code (*NTIS only*).

Blocks 17. - 19. Security Classifications. Self-explanatory. Enter U.S. Security Classification in accordance with U.S. Security Regulations (i.e., UNCLASSIFIED). If form contains classified information, stamp classification on the top and bottom of the page.

Block 20. Limitation of Abstract. This block must be completed to assign a limitation to the abstract. Enter either UL (unlimited) or SAR (same as report). An entry in this block is necessary if the abstract is to be limited. If blank, the abstract is assumed to be unlimited.

TRAC-TR-0597
April 1997



STUDY REPORT
44 TANK STUDY

Prepared by:

Certified and Approved for Release by:

Jeannette Blumenthal
JEANNETTE BLUMENTHAL
Operations Research Analyst

Gerald A. Klopp
GERALD A. KLOPP
GM-15, USA
Director, TRAC-LEE

DISTRIBUTION STATEMENT:
Approved for public release;
distribution unlimited



44 Tank Study

TABLE OF CONTENTS

	<u>Page</u>
Title Page.....	i
Table of Contents.....	ii
<u>Paragraph</u>	
Purpose.....	1
Background.....	1
Scope.....	1
Methodology.....	2
Findings.....	3
Related Efforts.....	6
Comparison.....	6
Conclusions.....	6

List of Figures & Tables

<u>Figure Number</u>		
1	Removing One Company From an Armor Battalion.....	1
2	Methodology.....	3
<u>Table Number</u>		
1	Reducing Armor Battalion Size Under AOE and Force XXI.....	2
2	Summary of Reduction in Requirements, Force XXI Heavy Division, Approved Interim Design - Objective	4
3	Summary of Reduction in Requirements, AOE Heavy Division.	5
4	OPLOGPLN 97 Results for AOE Heavy Division.....	6
5	Impact of Eliminating a Battalion VS a Company VS a Tank.....	6
A	"Back of the Envelope" Analysis.....	A-1
B-1	Force XXI Heavy Division, Approved Interim Design - Objective.....	B-1
B-2	AOE Heavy Division (M1A1).....	B-2
B-3	AOE Heavy Division (M1A2).....	B-3

Appendices

"Back of the Envelope" Analysis.....	A
Detailed Tables.....	B
References.....	C
Acronyms.....	D
Briefing Slides.....	E

44 Tank Study

Purpose. To assess the impact upon Combat Service Support (CSS) of changing the number of tanks in a battalion from 58 to 44.

Background. On T8 November 1996, the Combined Arms Support Command (CASCOM) briefed LTG Miller, Commander, Combined Arms Command (CAC), on CSS in the Force XXI Division. During that briefing, LTG Miller asked CASCOM to determine the impact on CSS of reducing the number of tanks in an Armor Battalion from 58 to 44. MG Guest, Commander, CASCOM, passed this tasking on to TRADOC Analysis Center - Fort Lee (TRAC-LEE). TRAC-LEE provided an initial, "back of the envelope" estimate the same day. This estimate was based upon the manpower analysis completed in 1994 for the M1A2 Abrams Cost and Operational Effectiveness Analysis (COEA) which supported a Milestone III decision. A summary of the results of this quick turn-around analysis is at Appendix A. Dr. Klopp, Director, TRAC-LEE, agreed to provide a more rigorous analysis as the required data became available.

Scope.

TRAC-LEE's preliminary work considered an Army of Excellence (AOE) Heavy Division with five Armor Battalions, four Mechanized Battalions, and two Attack Helicopter Battalions (AHB). The ground combat units are organized into two Brigades, one with three Armor Battalions, the other with two. The final analysis focused on the Force XXI Heavy Division, Approved Interim Design - Objective, which has four Armor Battalions, five Mechanized Battalions, and one AHB. The ground combat units are organized into three Brigades, one with two Armor Battalions and the others with one Armor Battalion each. TRAC-LEE interpreted the fourteen tank reduction to be equivalent to an Armor Company and assessed the impact of removing an entire company from each Armor Battalion. Figure 1 depicts this basic assumption and its effect on a Force XXI Armor Battalion.

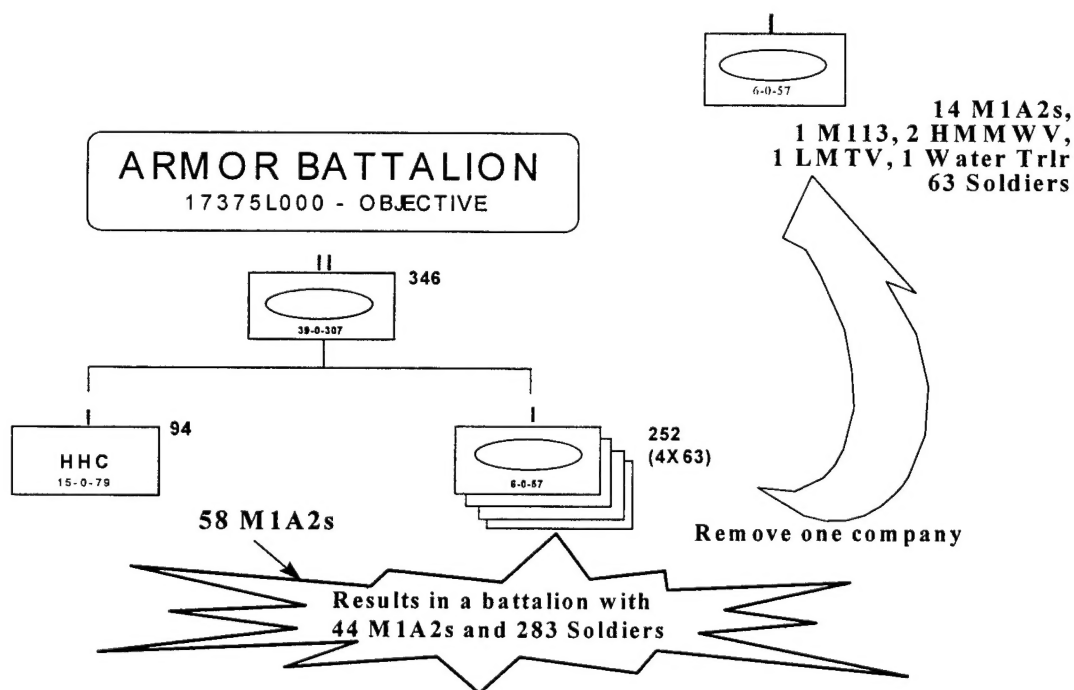


Figure 1. Removing One Company from an Armor Battalion

Table 1 provides a summary of this approach in terms of an AOE Heavy Division and the Force XXI Heavy Division, Approved Interim Design - Objective.

Table 1. Reducing Armor Battalion Size under AOE and Force XXI

AOE Heavy Division	Force XXI Heavy Division
Remove: One Company from each Battalion	Remove: One Company from each Battalion
→ 70 M1A1s or M1A2s 5 Companies and parts of their Battalion's unit maintenance	→ 56 M1A2s 4 Companies and parts of their associated FSCs

Methodology (Figure 2).

a. Identification of Affected Units and Equipment. After identifying the affected units and their associated force structure, we developed a list of specific Associated Support Items of Equipment (ASIOE) affected by tank density as delineated in the M1A1 Abrams Tank Basis of Issue Plan (BOIP) and the M1A2 BOIP. M1A1 data was substituted for M1A2 data when the latter was incomplete. Quantities were computed based upon a 58 tank Armor Battalion and a 44 tank Armor Battalion.

b. Maintenance Manpower. After calculating the maintenance workload based upon the Manpower Requirements Criteria (MARC) for major items of equipment in the companies and the ASIOE for an Armor Battalion with 58 tanks in four companies, we recalculated the workload based upon a battalion with 44 tanks in three companies. Calculations for the AOE structure were done using both the M1A1 MARC and the M1A2 MARC. Maintenance workload for the items of interest was aggregated based upon the brigade structures identified above. We captured the differences, in terms of soldiers—sometimes expressed as a fractional requirement—and equipment, and compared those to the support force structure to identify possible further reductions in support equipment and personnel. This process was repeated to quantify additional differences. The cumulative maintenance manpower totals for the Division based upon a 58 tank battalion and the Division based upon a 44 tank battalion were captured and consolidated for unit level, Direct Support (DS), and General Support (GS) maintenance. After this consolidation, fractional values were rounded to whole numbers with all values between zero and one rounded to one.

c. Other Manpower. Operational personnel, such as tanks crews and vehicle drivers, were identified along with the equipment. In all cases, where exact relationships were not identifiable, estimates were conservative. For example, freeing up a Heavy Expanded Mobility Tactical truck (HEMTT) or a fueller could free-up two soldiers, but we only estimated one driver saved. We assumed that the operators of other vehicles could have other duties unrelated to the vehicle and did not identify soldier savings on a one-for-one with vehicles. Hence the uncertainty of the estimate and the “+” in reference to the Forward Support Company (FSC) Supply and Transportation (S&T) personnel in Table 2.

d. Total Reduction in Requirement. We identified the difference in the number of soldiers between the two Division structures—58 tank Armor Battalion and 44 tank Armor Battalions—for both the Force XXI Heavy Division and an AOE Heavy Division. The maintenance manpower and other support differences are consolidated in the support reduction in requirement subtotal, while combat operations manpower differences—crew, command positions, and others—are captured in the direct reduction subtotal. The personnel reductions identified for the Force XXI structure are not comparable to the AOE reductions since they are based upon different equipment as well as force structure changes.

e. Ammunition and Fuel Support.

To assess the impact upon the Division's transportation (fuel delivery) and ammunition handling systems, we ran the 1997 release of the Operations Logistics Planner (OPLOGPLN '97) (version 1.40) with the AOE Heavy Division force structure and M1A2 tanks. OPLOGPLN '97 is a computer-based program designed to assist logistics planners in calculating supply usage estimates in support of operations. Like its predecessor, the Supply Usage Requirements Estimator (SURE), OPLOGPLN '97 allows the logistician to calculate supply estimates by class of supply for selected units. OPLOGPLN '97 is designed specifically to support operations typically associated with multi-phase operation plans and operation orders. The user creates units based upon standard Tables of Organization and Equipment (TOE) and maps these units into task organizations. The task organizations can then be assigned to a multi-phase order and assigned user-developed mission parameter sets. Reports can then provide supply consumption by unit, task organization, phase, and order.

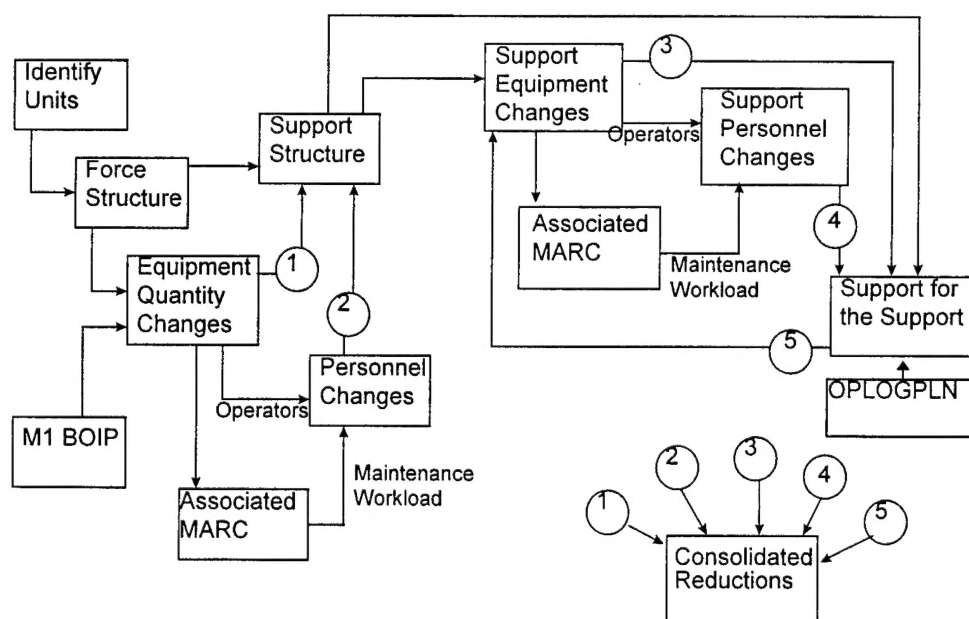


Figure 2. Methodology

The Force XXI release of OPLOGPLN did not have the exact Force XXI Heavy Division, Approved Interim Design - Objective loaded. Due to time constraints and the lack of significant impacts revealed in the consumption reports generated by the '97 AOE version, we did not modify the software and did not use OPLOGPLN for the Force XXI analysis.

Findings.

For the Force XXI Division with four Armor Battalions organized into three brigades, the overall reduction in personnel requirements which result from eliminating one company from each Armor Battalion are shown in Table 2. Of the 347 soldiers "freed up" when the companies are eliminated, over 70 percent are operations spaces—primarily crew for the tanks—which include command spaces. Table 3 provides similar information for an AOE Heavy Division with five M1A2 Armor Battalions. Although the Force XXI analysis and results are of primary interest, we have included the AOE findings for completeness and to serve as a frame of reference.

Table 2. Summary of Reduction in Requirements, Force XXI Heavy Division, Approved Interim Design
- Objective (4 M1A2 Battalions)

	Battalion	Division
Total Personnel Reduction		347
Direct (Combat Operations) Personnel Reduction Subtotal		252
Company Personnel	63	252
Crew	56	224
Others	7	28
Company Equipment		
M1A2	14	56
M113A3	1	4
HMMWV	2	8
LMTV Cargo Truck	1	4
Water Trailer, 400 gal	1	4
Support Personnel Reduction Subtotal		95
FSC Maintainers ¹	6 to 8	28
FSC S&T ²	10+	40
DS Maintainers ³	---	27
FSC Equipment		
HEMTTs (LHS) ⁴	3 (1)	12 (4)
Fuelers ⁵	2	8
LMTV Cargo Trucks	4	16
LMTV Trailers	3	12
MTV Cargo Trucks	2	8
MTV Trailer	1	4
HMMWVs	2	8
M88AA1E1	1	4
Field Feeding Kitchen	1	4
GS Maintainers ⁶	----	14 ⁷

¹ Depends upon how maintenance workload is rolled up—two Armor battalions in a Brigade or one.

² Depends upon how many dedicated drivers there are for the equipment shown.

³ This maintenance may be performed by other than Division personnel either in the Division area or at an Echelon Above Division (EAD).

⁴ Assumes 15 HEMTTs or 7 LHS supporting 58 tanks (one battalion).

⁵ Assumes 12 fuelers supporting 58 tanks (one battalion).

⁶ All or part of this maintenance may be performed by other than Division personnel either in the Division area or at an EAD.

⁷ GS Maintenance personnel are not included in the Division totals shown above.

Table 3. Summary of Reduction in Requirements, AOE Heavy Division (5 M1A2 Battalions).

	Battalion	Division
Total Personnel Reduction		374
Direct (Combat Operations) Personnel Reduction Subtotal		315
Company Personnel	63	315
Crew	56	280
Others	7	35
Company Equipment		
M1A2	14	70
M113A3	1	5
M998 Utility Truck	2	10
LMTV Cargo Truck	6	30
Support Personnel Reduction Subtotal		59
Brigade/Battalion Maintainers Subtotal		28
Other Brigade/Battalion Level Support ⁸	---	---
DS Maintainers	---	31
Battalion/Brigade Equipment		
HEMTTs ⁹	3	15
Fuelers ¹⁰	2	10
LMTV Cargo Trucks	6	30
M998 Utility Trucks	2	10
Field Feeding Kitchen	1	5
GS Maintainers ¹¹	---	15 ¹²

Appendix B contains tables providing detailed quantities in terms of the 58 tank structure as it compares to the 44 tank structure for both the Force XXI Division and the AOE Division with M1A2 and M1A1 tanks. All maintenance manpower information was calculated at the Military Occupational Specialty (MOS) level of detail. The spreadsheets developed for these calculations are available from TRAC-LEE independent of this report.

OPLOGPLN '97 generated consumption for the AOE Heavy Division is provided in Table 4. The one percent reduction for Ammunition spread across the Armor units of an entire division is negligible. A change of this magnitude will not affect the force structure. Since the seven percent reduction in fuel also is dispersed across the Brigades, it likewise will not have a significant impact upon the support force structure. The "freeing-up" of ammunition carriers and fuelers merely reduces the risk associated with the support of the rest of the combat force.

⁸ The analysis of the AOE force structure did not cover additional layers of support.

⁹ Assumes 15 HEMTTs supporting 58 tanks (one battalion).

¹⁰ Assumes 12 fuelers supporting 58 tanks (one battalion).

¹¹ Some of this maintenance may be performed by other than Division personnel either in the Division area or at an EAD.

¹² GS Maintenance personnel are not included in the Division totals shown above.

Table 4. OPLOGPLN 97 results for AOE Heavy Division (5 M1 Battalions, 4 BFVS, 2 AHB)

OPLOGPLN Data ¹³	58 Tank	44 Tank	Difference	Percent Reduction
Fuel (One day consumption)				
Attack posture	657,422.31	612,203.93	45,218.38	7%
Other	641,515.57	597,987.59	43,527.98	7%
Ammunition (STONS)				
Attack 1 st Day (Moderate)	1,476.11	1,458.45	17.66	1%
Attack-Succeeding Day (Moderate)	489.11	483.25	5.86	1%
Defend-Succeeding Day (Light)	1,180.97	1,166.82	14.15	1%

Related Efforts. In a parallel effort, CASCOM first evaluated the effect on the Force XXI Division of removing one tank per tank platoon and then quantified the impact of eliminating an entire Armor Battalion. Table 5 provides a summary of these approaches and the impacts identified as they compare to the analysis done on removing one company from each battalion. The changes in maintenance support requirements among the three approaches are not linear due to maintenance consolidation and rounding rules. Whether the fractional requirement is 0.4, 0.9, or 1.4, you still need one maintenance person.

Table 5. Impact of Eliminating a Battalion VS a Company VS a Tank.

Force XXI Heavy Division		
Remove:		
One Battalion	One Company from each Battalion	One Tank from each Platoon
Impact (Reduces Requirements By):		
→ 58 M1A2s	→ 56 M1A2s	→ 48 M1A2s
4 Companies & HHC	4 Companies	3 M1A2s from each Company
FSC	parts of 4 FSCs	smaller parts of 4 FSCs
30+DS Maintenance	27 DS Maintenance	18 DS Maintenance
583 Soldiers	347 Soldiers	210 Soldiers (192 crew)

Comparison. The largest decrease in requirements as a result of reducing the number of tanks in a Division is in direct positions—crew. Removing force structure at a higher aggregate level, e.g., eliminating an entire battalion instead of one company from each battalion, results in more operational overhead decreases and consolidates the CSS reductions; however, each action has different operational implications. As larger aggregates are taken—there are fewer tanks, less firepower, and fewer command positions. The total elimination of one unit's maintenance workload does nothing to ease the workload of other units. Battlefield coverage and span of control shift, information gaps become more apparent, and the brigade becomes less flexible since it is no longer a "heavy" brigade.

Conclusions. In the Force XXI Division, the impact upon CSS due to the decrease in the number of tanks in each Armor Battalion is a minor reduction in the requirements for CSS personnel—maintainers and vehicle operators—with a small reduction in the number of support vehicles. For the Division, the

¹³ All consumption rates are for the entire Division for one day. OPLOGPLN 97 lists the M1A2 Line Item Number (LIN) in all Armor Units.

largest personnel change is in direct positions—crew. For the Force XXI Heavy Division, Approved Interim Design - Objective, 73 percent of the reduction in personnel requirements is attributable to operational combat positions. The impact upon CSS is small compared to the reductions in the rest of the force structure. At the forward support level, about forty percent of the positions are some type of maintenance. If all or part of the DS maintenance requirement is not counted in this total, the shift is greater—up to 79 percent of the reduction would be due to the combat operations positions. In addition, the CSS positions are more difficult to identify and quantify. Much of the CSS support is not totally dedicated to the tanks. Everything that moves needs fuel; all weapon systems need ammunition resupply. Even the majority of maintainers work on more than just the tanks. Any reduction in CSS structure has a potentially broad impact and increases the risk of not having enough support for the systems that remain.

Appendix A

The following table shows the results of the "back of the envelope" analysis which was based upon the manpower analysis completed in 1994 for the M1A2 Abrams Cost and Operational Effectiveness Analysis (COEA) which supported a Milestone III decision.

"Back of the Envelope" Analysis.

Back of the Envelope - Tanks	58 Tank	44 Tank	Difference	Percent Reduction
Tanks in a Battalion	58	44	14	24%
Bn Maintenance for tanks	30	22	8	27%
DS for tanks	357	262	95	27%
Total Force (Tank Support)	1366	1014	352	26%
Bn HEMTTs	15	11	4	27%
OPLOGPLN Battalion Level				
Class III (Bulk)	42,856	34,657	8,199	19%
Class V (STON)	34.54	31.78	2.76	8%

Appendix B

Table 1. Force XXI Heavy Division, Approved Interim Design - Objective (4 M1A2 Battalions).

Description	58 Tank	44 Tank	Difference	Percent Reduction
Personnel ¹				
Maintenance				
Brigades (Tank Support)	151	123	28	19%
DS (Tank Support) ²	126	99	27	21%
GS (Tank Support) ³	67	53	14	21%
Other Support				
FSC S&T	72	62	10	14%
FSC 4 Battalion Roll-up	288	248	40	14%
Combat Operations ⁴				
Tank Company (Crew +)	63	63	----	
Battalion (4 to 3 AR Companies)	252	189	63	25%
Division (16 to 12 AR Companies)	1008	756	252	25%
Equipment (not compared to Division Totals)				
Tanks M1A2 — Company	14	14	----	
—Battalion	58	44	14	24%
— 4 Battalion Roll-up	232	176	56	24%
M113 Personnel Carrier — Company	1	1	----	
— 4 Battalion Roll-up	16	12	4	25%
HMMWV—Company	2	2	----	
—FSC	16	14	2	13%
— 4 Battalion Roll-up (w/ FSCs)	96	80	16	17%
Truck Cargo LMTV — Company	1	1	----	
—Battalion (Company Support+Company)	24	18	6	25%
—FSC	22	18	4	18%
—4 Battalion Roll-up (w/ FSCs)	184	144	40	22%
HEMTTs ⁵ “freed up”				
— Battalion	15	12	3	20%
— 4 Battalion Roll-up	60	48	12	20%
Fuelers ⁶ “freed up”				
— Battalion	12	10	2	17%
— 4 Battalion Roll-up	48	40	8	17%

¹ Ripple impact on CSS/Personnel Service Support (PSS) not addressed. Maintenance is that generated by the tank and its ASIOE (based upon the BOIP).

² Some of this maintenance may be performed by other than Division personnel either in the Division area or at an EAD.

³ This maintenance may be performed by other than Division personnel either in the Division area or at an EAD.

⁴ Covers only those personnel in the Companies.

⁵ Does not reflect the total number of HEMTTs in the Brigade or Division.

⁶ Does not reflect the total number of Fuelers in the Brigade or Division.

Appendix B

Table 2. AOE Heavy Division (5 M1A1 Battalions, 4 BFVS, 2 AHB).

Description	58 Tank	44 Tank	Difference	Percent Reduction
Personnel ⁷				
Maintenance				
Brigades (Tank Support)	139	107	32	23%
DISCOM (Tank Support)	135	104	31	23%
Other Support ⁸	---	---	--	---
Combat Operations ⁹				
Tank Company (Crew +)	63	63	----	
Battalion (4 to 3 AR Companies)	252	189	63	25%
Division (20 to 15 AR Companies)	1260	945	315	25%
Equipment				
M1A1 Tanks – Company	14	14	----	
— Battalion	58	44	14	24%
— Division Total	317	247	70	22%
M113 Personnel Carrier — Company	1	1	----	
— Division (Company Requirement)	20	15	5	25%
— Division Total	269	264	5	2%
M998 Utility Truck – Company	2	2	----	
— Division (Company Requirement)	40	30	10	25%
— Division Total	1155	1145	10	0.9%
Truck Cargo LMTV – Company	1	1	----	
— Battalion (Company Support +Co) ¹⁰	24	18	6	25%
— Division Total	609	579	30	5%
HEMTTs ¹¹ “freed up”				
— Battalion	15	12	3	20%
— 5 Battalion Roll-up	75	60	15	20%
Fuelers ¹² “freed up”				
— Battalion	12	10	2	17%
— 5 Battalion Roll-up	60	50	10	17%

⁷ Ripple impact on CSS/PSS not addressed. Maintenance is that generated by **the tank and its ASIOE** (based upon the BOIP).

⁸ The number of support personnel other than maintainers was not estimated for the AOE units.

⁹ Covers only those personnel in the Companies.

¹⁰ LMTV distribution is one in the Company and five in the Battalion to support each Company, i.e., six LMTV in each Battalion for the support of each Company.

¹¹ Does not reflect the total number of HEMTTs in the Brigade or Division.

¹² Does not reflect the total number of Fuelers in the Brigade or Division.

Appendix B

Table 3. AOE Heavy Division (5 **M1A2** Battalions, 4 BFVS, 2 AHB).

Description	58 Tank	44 Tank	Difference	Percent Reduction
Personnel ¹³ —				
Maintenance				
Brigades (Tank Support)	120	92	28	23%
DISCOM (Tank Support)	135	104	31	23%
Other Support — same as M1A1				
Combat Operations — same as M1A1				
Equipment — same as M1A1				

¹³ Ripple impact on CSS/PSS not addressed. Maintenance is that generated by **the tank and its ASIOE** (based upon the BOIP).

Appendix C

References

- Army MARC Maintenance Data Base, 17 Jan 97 printing
Annual Maintenance Man Hours (AMMH) by Line Item Number (LIN)
- Basis of Issue Plan (BOIP) Feeder Data, Total Asset Visibility System, Qualitative Quantitative Personnel Requirements Information (QQPRI)
Tank Combat 105MM M1IP (Abrams) LIN: T13374
Tank Combat 120MM M1A1 (Abrams) LIN: T13168
Tank Combat 120MM M1A2 (Abrams) LIN: T13305
Associated Support Items of Equipment (ASIOE) and their basis of issue.
- AR 570-2, Manpower Requirements Criteria
Annual available MOS time.
- OPLOGPLN 97
Division SRC 87000A300: Armor Division (5 M1, 4 BFVS, 2 AHB).
- AR 611-201, Enlisted Career Management Fields and Military Occupational Specialty

Author: "Lundy, Anniestine CPT" <lundya@lee-dns1.army.mil> at internet
Date: 4/7/97 7:54 AM
Priority: Normal
TO: blumentj at trac-lee
Subject: 44 Tank Study

----- Message Contents -----
We have reviewed your revised final draft. No significant comments
were noted.

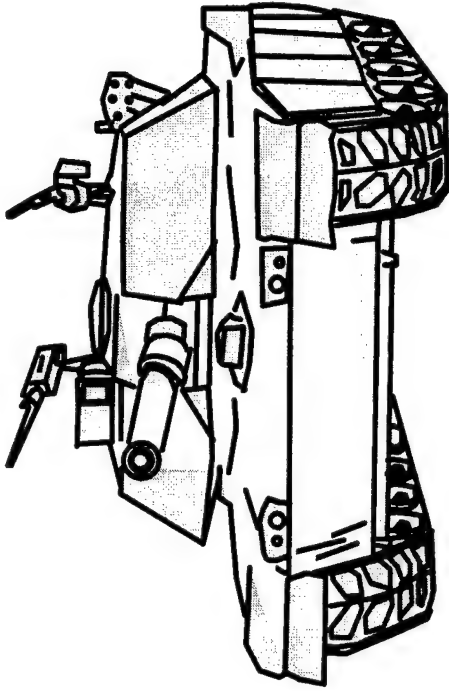
VR,
CPT Lundy

APPENDIX D

ACRONYMS

AHB	Attack Helicopter Battalion
AMMH	Annual Maintenance Man Hours
AOE	Army of Excellence
ASIOE	Associated Support Items of Equipment
BOIP	Basis of Issue Plan
BFVS	Bradley Fighting Vehicle System
CAC	Combined Arms Command
CASCOM	Combined Arms Support Command
COEA	Cost and Operational Effectiveness Analysis
CSS	Combat Service Support
DISCOM	Division Support Command
DS	Direct Support
EAD	Echelon(s) Above Division
FSC	Forward Support Company
GS	General Support
HEMTT	Heavy Expanded Mobility Tactical Truck
HHC	Headquarters and Headquarters Company
HMMWV	High Mobility Multipurpose Wheeled Vehicle
LHS	Load Handling System
LIN	Line Item Number
LMTV	Light Mobility Tactical Vehicle
M113A3	Armored Personnel Carrier
M1A2	Abrams Tank
M88AA1E1 (IRV)	Armored Recovery Vehicle
MARC	Manpower Requirements Criteria
MOS	Military Occupational Specialty
MTV	Medium Tactical Vehicle
OPLOGPLN	Operations Logistics Planner
OPLOGPLN '97	Operations Logistics Planner 1997 release (version 1.40)
PSS	Personnel Service Support
QQPRI	Qualitative Quantitative Personnel Requirements Information
S&T	Supply and Transportation
STONS	Short Tons
SURE	Supply Usage Requirements Estimator
TOE	Tables of Organization and Equipment
TRAC-LEE	TRADOC Analysis Center - Fort Lee
TRADOC	Training and Doctrine Command
VS	Versus

APPENDIX E
Briefing Slides



44 Tank Study

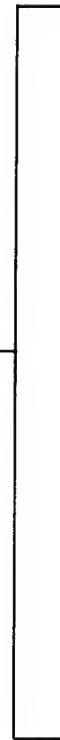
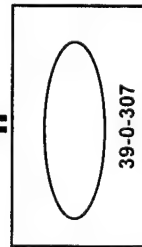
Purpose: Assess the impact on CSS of changing the number of tanks in a battalion from 58 to 44.

What we did.

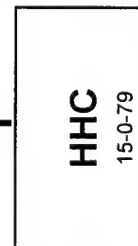
ARMOR BATTALION

17375L000 - OBJECTIVE

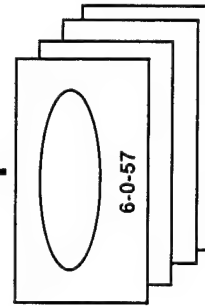
II 346



I 94



252
(4X63)

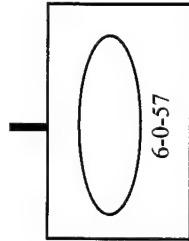


58 M1A2s

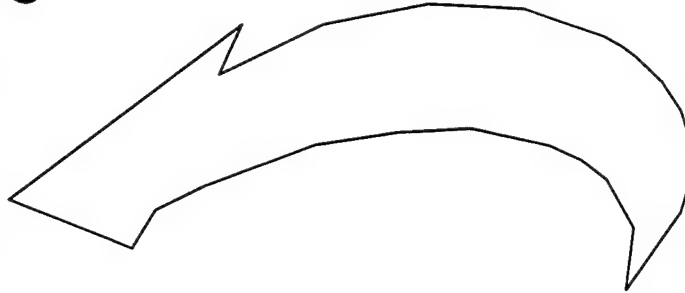
Remove one company

Results in a battalion with
44 M1A2s and 283 Soldiers

2-Apr-97



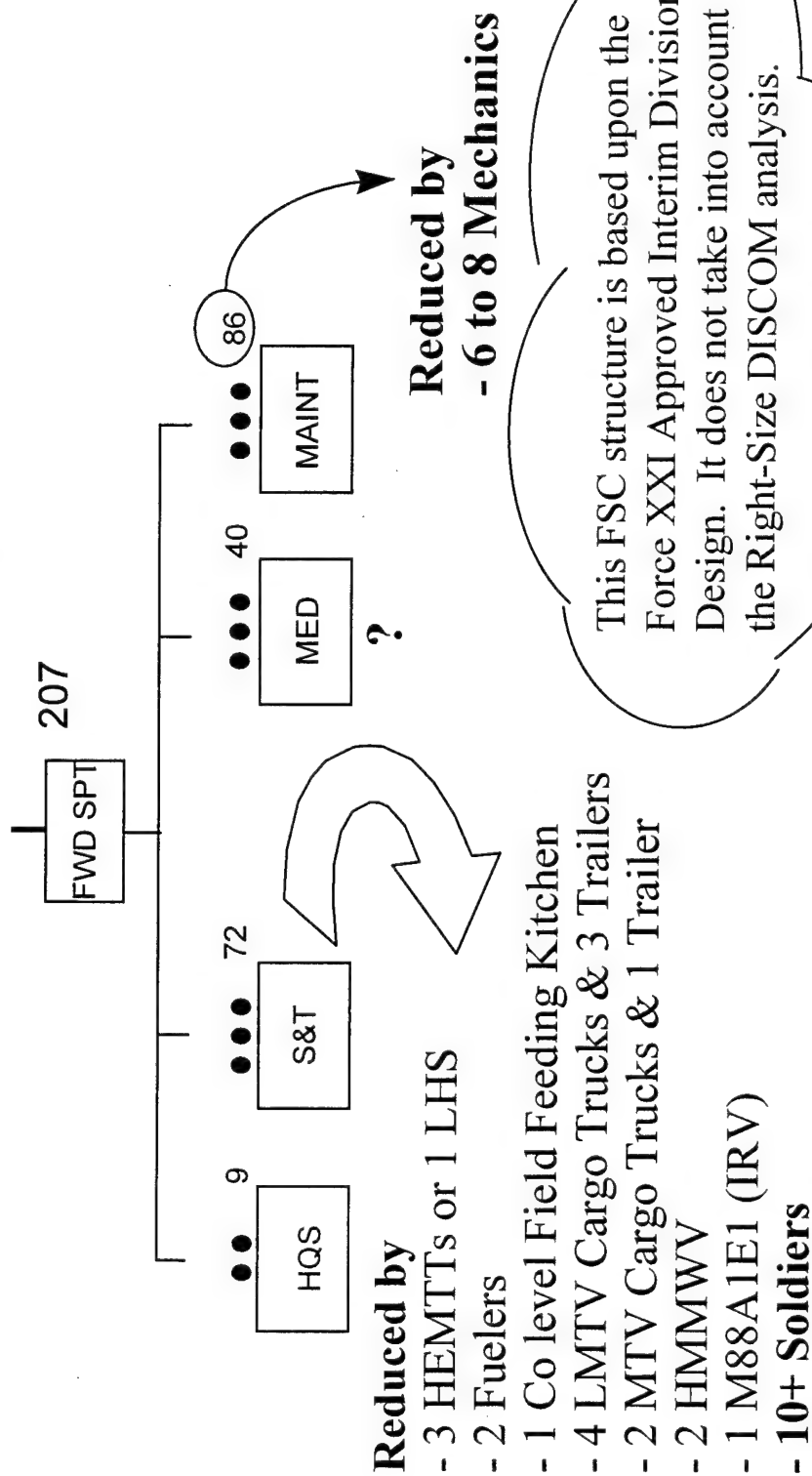
14 M1A2s,
1 M113, 2 HMMWV,
1 LMTV, 1 Water Trlr
63 Soldiers



Support Impact (each FSC).

FORWARD SUPPORT COMPANY (AR)

63XX7AXXX -OBJECTIVE



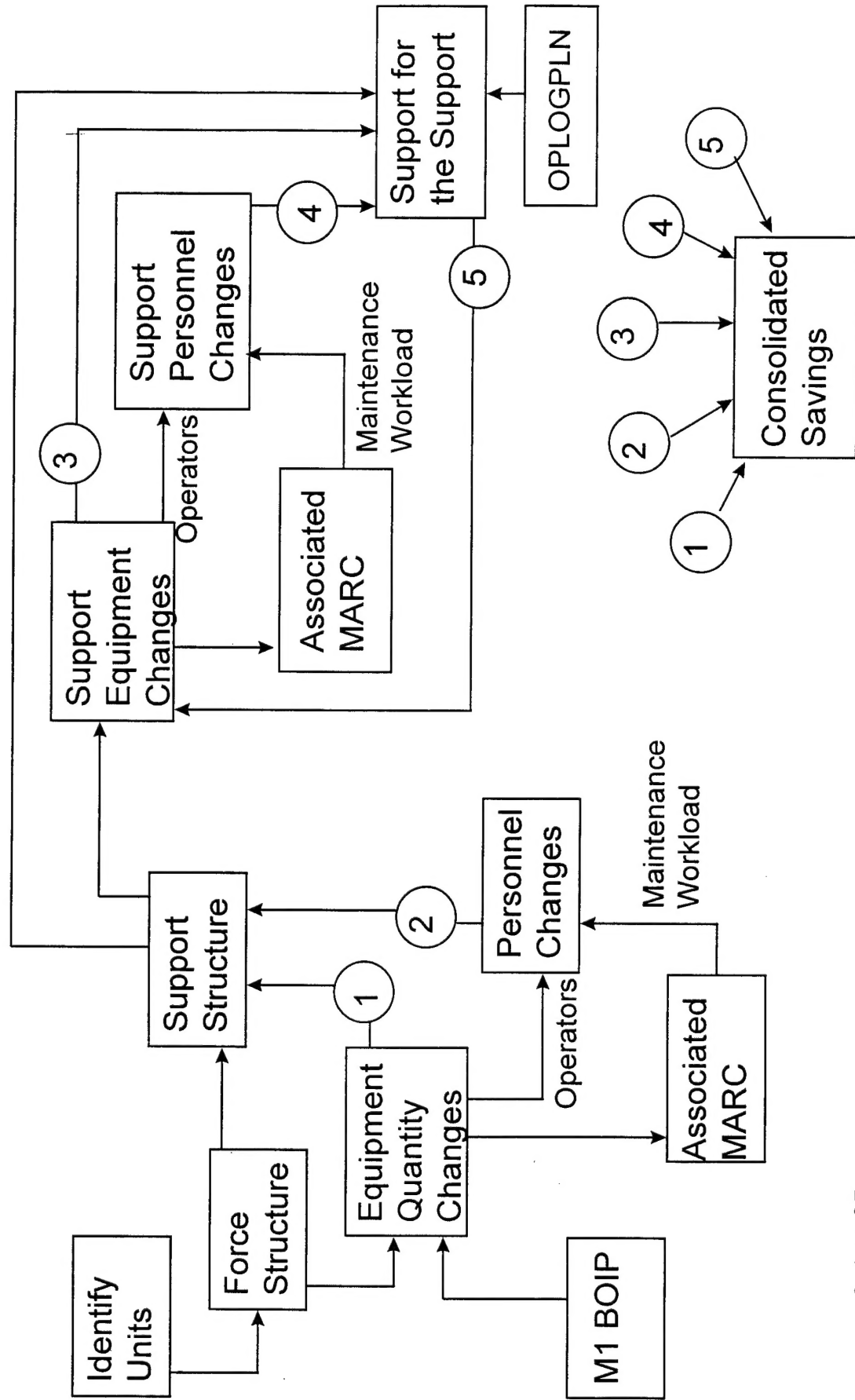
2-Apr-97

For the Division:

Personnel Total	347
Direct Reduction in Requirements	252
Company Personnel	
Crew	224
Others	28
Support Reduction in Requirements	95
FSC Maintainers	28
FSC S&T	40
DS Maintainers	27

There is also a requirement for 14 GS maintainers.

How we did it.



Conclusions.

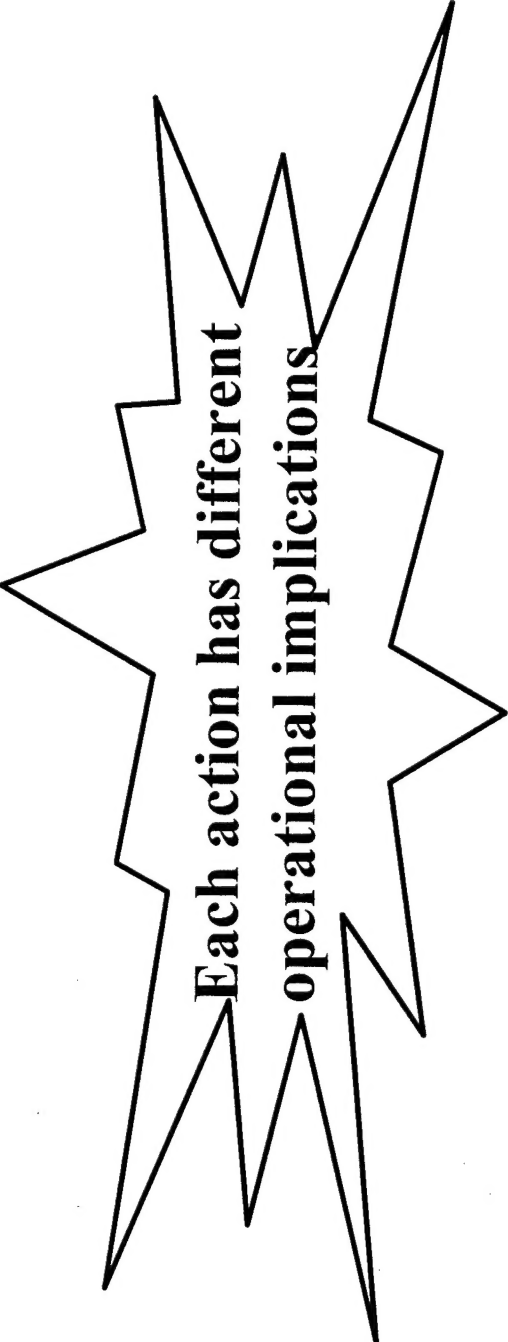
- Removing force structure at a higher aggregate level results in more operational overhead savings and consolidates the CSS savings.

E-7

- Each action has different operational implications.

Remove:

One Battalion → 58 M1A2s 4 Co & HHC FSC 30+DS Maint 583 Soldiers	One Co from each Bn → 56 M1A2s 4 Co parts of 4 FSC 27 DS Maint 347 Soldiers	One Tank from each Platoon → 48 M1A2s 3 M1A2s from each Co smaller parts of 4 FSC 18 DS Maint 210 Soldiers (192 crew)
---	--	--



**Each action has different
operational implications**

As larger aggregates are taken--

- fewer tanks, less firepower, fewer command positions
- total elimination of one unit's maintenance workload does not ease workload of other units
- battlefield coverage and span of control shift
- information gaps become more apparent
- brigade less flexible (no longer "heavy")

References:

Army MARC Maintenance Data Base, 17 Jan 97 printing
Annual Maintenance Man Hours (AMMH) by Line Item Number (LIN)

Basis of Issue Plan (BOIP) Feeder Data, Total Asset Visibility System, Qualitative
Quantitative Personnel Requirements Information (QQPRI)

Tank Combat 105MM M1IP (Abrams) LIN: T13374

Tank Combat 120MM M1A1 (Abrams) LIN: T13168

Tank Combat 120MM M1A2 (Abrams) LIN: T13305

Associated Support Items of Equipment (ASIOE) and their basis of issue.

AR 570-2, Manpower Requirements Criteria
Annual available MOS time.

AR 611-201, Enlisted Career Management Fields and Military Occupational
Specialty

OPLOGPLN 97

Division SRC 87000A300 Armor Division (5 M1, 4 BFVS, 2 AHB)
The M1A2 LIN is in the database.

2-Apr-97